Madicken Munk

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Education

University of California, Berkeley
PhD, Nuclear Engineering — Anticipated August 2016
Master of Science, Nuclear Engineering — 2013
Oregon State University
Bachelor of Science, Nuclear Engineering — 2011

Research Interests

Computational methods for neutron transport, including hybrid deterministic / Monte Carlo neutron transport; advanced nuclear reactor systems; reactor physics; and nontraditional applications of nuclear science.

Research Experience

University of California, Berkeley Nuclear Engineering Department — August 2011 to Present

- Developed hybrid deterministic / Monte Carlo transport method to reduce variance reduction in shielding problems with strong angular anisotropy. (*Collaboration with ORNL*) [**Denovo S_N, MCNP, Advantg, Python**]
- Design of a neutron source for in-situ irradiation of geological samples for $^{40}Ar/^{39}Ar$ geochronology of Martian samples. **(***Collaboration with Scottish Universities Environmental Research Centre (SUERC) and Berkeley Geochronology Center (BGC)*). [**MCNP, Python**]
- Computed radiation-induced swelling of graphite reactor core components in a Fluoride Salt-Cooled High Temperature Reactor (FHR) for component lifetime evaluation. [**MCNP, COMSOL, Matlab**]
- Designed a fluoride salt-cooled high temperature test reactor (FHTR) reactor core to match reactor physics parameters of a larger FHR design. [**MCNP, ORIGEN**]

Oregon State University Radiation Center — June 2008 to August 2011

- Calculated Molybdenum-99 production in the Oregon State TRIGA reactor from specifically designed targets. [**MCNP, Matlab**]
- Verification of Reed College reactor for updated Safety Analysis Report and license renewal. [**MCNP**]

Teaching Experience

NE 155, Introduction to Numerical Simulations in Radiation Transport — Spring 2014

- Graduate Student Instructor: held office hours, led midterm review sessions, graded homework assignments, lectured for two class hours

NE 250, Nuclear Reactor Theory — Spring 2012

- Graduate Student Instructor: held office hours, led midterm and weekly review sessions, graded homework assignments and exams, helped develop exam and homework questions

NE 101, Nuclear Reactions and Radiation — Fall 2011, 2014

- Graduate Student Instructor: held office hours, led weekly review lectures, graded homework assignments and exams
- Awarded “Outstanding Graduate Student Instructor Award”

Mentorship Experience

Garrett Baltz (2015-2016) – facilitated the creation and development of dry cask storage input files for both SCALE 6.2b and MCNP. Helped to develop independent research project relevant to Garret's individual interests.
Mentors and Mentees – co-founder of undergraduate peer mentoring program for undergraduate students. Helped organize events to promote networking between students in engineering.

Scholarships and Awards

- ANS Best Graduate Paper Award, Student Conference — Spring 2014
- Outstanding Graduate Student Instructor Award — 2013-2014
- UC Regents Fellowship, UC Berkeley — 2014
- NRC Fellowship, UC Berkeley — 2011-2012
- DOE NEUP Scholarship Awardee — 2010-2011
- Karena Dokken Memorial Scholarship Recipient — Spring 2010
- Awarded NRC Scholarship by OSU department of NE/RHP — Fall 2009
- Awarded National Academy for Nuclear Training Scholarship — Summer 2009
- Grund Memorial Scholarship Awardee — Fall 2009
- DOE NEUP Scholarship Awardee — 2009-2010
- Intel Scholar — Summer 2008

Publications, Presentations and Patents

Peer-Reviewed Journals

- Morgan, L., Davidheiser-Kroll, B., Munk M., et al., "Instrumentation Development for planetary in-situ $^{40}Ar/^{39}Ar$ Geochronology," Acta Astronautica, 2015 (submitted).

Conference Proceedings

- Munk, M., Slaybaugh, R. N., "An Angle-Informed Method for CADIS and FW-CADIS", PHYSOR 2016, Sun Valley, ID, May 2016 (submitted).
- Munk, M., Morgan, L., Davidheiser-Kroll, B., et al., "Design and Feasibility Study of a Compact Neutron Source for Extra-terrestrial Geochronology Applications", Joint International Conference on Mathematics and Computation (M&C), Nashville, TN, April 2015.
- Munk, M., Morgan, L., Davidheiser-Kroll, B., et al., "Instrumentation Development for planetary in-situ $^{40}Ar/^{39}Ar$ Geochronology", American Nuclear Society Winter Meeting, Reno, NV, November 2014.
- Morgan, L., Davidheiser-Kroll, B., Munk M., et al., "Instrumentation Development for planetary in-situ $^{40}Ar/^{39}Ar$ Geochronology", Goldschmidt Conference June 2014.
- Munk, M., "Use of Comsol Multiphysics for the Evaluation Of Radiation-Induced Stresses in the PB-FHR", American Nuclear Society Student Conference, State College, PA, April 2014.
- Munk, M., Cisneros, A. T., Greenspan, E., Peterson, P.F., "Preliminary Design of a FHR Test Reactor Core", American Nuclear Society Annual Meeting, Chicago, IL, June 2012.
- Munk, M., "Optimization of Molybdenum-99 Production in Oregon State TRIGA Reactor", American Nuclear Society Student Conference 2010.
- Munk, M., "Production of Medical Isotope in Oregon State University TRIGA Reactor", poster presentation. 1st International Nuclear Energy Conference, Warsaw, Poland, April 2011.

Technical Reports and Whitepapers

- Cisneros, A., et al., "Fluoride-Salt-Cooled, High-Temperature Reactor (FHR) Methods and Experiments Program White Paper." UCBTH-12-002, Department of Nuclear Engineering, UC Berkeley (2013).
- Cao, G., et al., "Fluoride-Salt-Cooled, High-Temperature Reactor (FHR) Materials, Fuels and Components White Paper." UCBTH-12-003, Department of Nuclear Engineering, UC Berkeley (2013).
- Carpenter, D., et al., "Fluoride-Salt-Cooled, High-Temperature Reactor (FHR) Development Roadmap and Test Reactor Performance Requirements White Paper." UCBTH-12-004, Department of Nuclear Engineering, UC Berkeley (2013).

Patents

- "Molybdenum Production in a Low-Power Reactor", Palmer, T.S., Reese, S., Keller, S.T., Munk, M., application submitted July 2010.

Service

- Vice President of University of California, Berkeley Chapter of Alpha Nu Sigma, 2013-Present
- President of Oregon State University student American Nuclear Society chapter, 2011-2012
- Secretary of Oregon State University student American Nuclear Society chapter, 2009-2011
- Member of Alpha Nu Sigma, Nuclear Engineering Honors Society, inducted May 2011
- President of Mentors and Mentees, an undergraduate peer-mentoring program at OSU 2009-2011
- College of Engineering Ambassador, Oregon State University 2008-2011

Skills

Software Packages	*Languages*	*Other Skills*
MCNP	Python 2 and Python 3	LaTeX
Denovo S_N	Bash	git
Scale	Matlab	make / CMake
Advantg	C++ (experience, not proficiency)	
COMSOL Multiphysics		
Origen		